

DESCRIPTION AMENDMENTS

Page 1, after the title, insert the following new paragraph:

CROSS REFERENCE TO RELATED APPLICATION

This application claims priority under 35 USC 119 of Australian Provisional Application No. 2002953110 filed December 5, 2002.

Rewrite paragraph [0004] to read as follows:

~~Australian Patent No. AU-A-12360/88 describes~~ Australian Patent No. AU-A-12360/88 describes a guidance control system for a laser guided boring machine for boring underground drains. The laser target has five light sensitive portions which emit voltages which when amplified are compared to predetermined threshold ~~values~~ values and an output signal actuates a pair of 24v motors. The motors drive linear actuators which adjust the direction of the boring bit.

Rewrite paragraph [0005] to read as follows:

Trials and contract boring show that if the electronic components of the device fail, they tend to do so in locations where service and repair is slow or unavailable. It has also been found that when the strata are uniform, surprisingly ~~infringement~~ infrequent corrections are required in practice, but this was only discovered when a non-automatic version was constructed and tested.

Rewrite paragraph [0007] to read as follows:

~~the endmost~~ The endmost part of the drive has a target for the laser beam, means to convey an image of the target and the laser strike position thereon to an operator situated remotely from the boring head and input means for the operator to adjust the direction of the endmost part of the drive.

Rewrite paragraph [0020] to read as follows:

A ~~sliding frame 16~~ static frame 15 engages the rails. The sliding direction conforms to the direction of the base frame and therefore is aligned with the bore path. A retractable drilling ~~frame 18~~ frame 16 slides on the ~~sliding frame 16~~ static frame 15. A laser ~~generator 20~~ generator 17 is mounted on the steel plate 8 just above the base frame. The laser ~~beam 22~~ beam 18 is adjusted to reach the required point at the target site. This arrangement is standard drain

layer's technology. The sliding frame 16 has a hydraulic ~~motor 24~~ motor 19 which is supplied by a pump (not shown) and located near the pit (by ~~conduits 26~~ conduits 20). The motor drives a shaft coupling 28 which is located above the slurry pipe 30, which discharges the slurry from the boring operation to a large capacity, vacuum vessel (50001) on a truck (not shown). The vacuum tube coupling 32 lies alongside the drive ~~coupling 34~~ coupling 28. A ~~pair of feed rams~~ A feed ram 36 connected between the ~~sliding frame 16~~ static frame 15 and the drilling ~~frame 18~~ push frame 16 pushes the drilling ~~frame 18~~ frame 16 in the feed direction and ~~retract~~ retracts it to the START position. The ~~sliding frame 16~~ static frame 15 is locked in position in the base frame by locking pins 30 (see Figure 2) which enter bores 38 in the rails. A video monitor 40 and a control console 42 are mounted on part of the ~~sliding frame 16~~ static frame 15 in front of the ~~operators~~ operator's platform 44.

Rewrite paragraph [0021] to read as follows:

Referring now to ~~Figures 2, 3A and 4~~ Figures 3, 4 and 5, the boring head is preferably 200-800 mm in diameter and comprises a cylindrical, steel plate shell 46 which has a removable cover 48. The trailing end has a union 50 for the vacuum hose and a ~~union 50~~ union 51 for the drive shaft 54 which couple to the corresponding parts on the ~~sliding~~ drilling frame 16 and to the add-on extension units (not shown) which drainage contractors utilise in the existing art.

Rewrite paragraph [0022] to read as follows:

A bearing box 52 of the drive shaft 54 is centrally supported at the trailing end. The universal coupling 56 is located adjacent the bearing box 52 and the drive shaft 54 extends to the leading end of the head and beyond to the boring bit 58. The space behind the boring bit 58 is subjected to the vacuum generated by the truck mounted installation and the slurry formed during boring enters an aperture 60 in the leading end of the shell 46 and is removed continuously. The water which helps to form the slurry is carried through the shell 46 by ~~conduit 26~~ conduit 60. The water enters the drive shaft 54 via rotary coupling 62 which takes the water through a coaxial passage to multiple outlets 64 in the boring bit 58.

Rewrite paragraph [0023] to read as follows:

The shaft is free to waggle in order to correct the bore direction. The shaft ~~aperture 60~~ aperture 63 through which the shaft projects is sufficiently large to permit 15° of angular movement. Ingress of slurry is prevented by seal 66. The adjustment of direction is achieved by suspending the shaft from two suspension ~~points 68, 70~~ points 68, 67 via a pair of double acting ~~rams 70, 72~~ rams 70, 72 which are fixed to shaft ~~sleeve 76~~ sleeves 74. Between the rams is a light reflecting, aluminum ~~target 80~~ target 76 showing several concentric rings. The rams are each served by ~~conduit 81~~ conduit 81 from common mains water supply 82. Twin valve assemblies 84, 86, 88, 90 control water input to the rams and water exit from the rams which exhaust into the drain 92. As the exhaust water from the rams is only a small intermittent volume, it drains into the excavated ground.

Rewrite paragraph [0024] to read as follows:

Video camera 94 illuminates and shoots the target continuously and sends a signal to the monitor. If the bit needs to rise or fall, both rams extend or retract equally. If the bit needs to move LEFT or RIGHT, one ram extends as the other ram drains. The solenoid ~~operator~~ operated valves ~~operated~~ operate on 24v dc from a joystick control on the ~~console 42~~ console 40.

The illustrated micro tunnelling machine is able to bore at a rate from 9-95 ft/hr.